

Appl. No. : 09/833,030  
Filed : April 10, 2001

### REMARKS

Claims 11 and 12 have been canceled as being drawn to non-elected invention. Therefore, Claims 2, 5-7, 10, and 13 are pending. No new matter has been introduced herewith. The following addresses the substance of the Office Action.

#### Compliance with 35 U.S.C. §103

The Examiner has rejected Claims 2, 5-7, 10 and 13 under 35 U.S.C. §103(a) as being allegedly obvious over Sundberg et al. (USP 5,624,711), Barner et al. (USP 5,986,066), and MacBeath et al. (Science 9/8/2000, 289:1760-1763). More specifically, the Examiner believes that it would have been obvious to a person with ordinary skill in the art at the time the invention was made to include the method step of oxidizing the surface of the support to produce an aldehyde as a functional group as taught by Barner et al. in the method of Sundberg et al. Applicants respectfully disagree.

To establish a *prima facie* case of obviousness a three-prong test must be met. First, there must be some suggestion or motivation, either in the references or in the knowledge generally available among those of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success found in the prior art. Third, the prior art must reference must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

Applicants maintain that Sundberg et al. relate to methods in which biological molecules are joined to polymerized glutaraldehyde. Figure 8 of this patent shows that glutaraldehyde is used as an intermediate reagent during the process of preparation of a thin polymer film on solid surfaces which includes silanizing a glass to provide a glass surface having primary amine functional groups, reacting these groups with a crosslinking agent (glutaraldehyde) and then treating the glass with solutions of the appropriate polymer (see col. 15, lines 54-64). Sundberg do not teach nor suggest the generation of aldehyde groups as an end product of mild oxidation as recited in the claims. Furthermore, Sundberg et al. do not teach or suggest oxidizing olefinic groups of the surface of solid support by adding permanganate, periodate or a mixture of permanganate and periodate solutions to obtain such aldehyde groups. In fact, the word "aldehyde" appears only twice in the entire description of Sundberg et al. and only in the word "glutaraldehyde" as discussed above.

Applicants maintain that Barner et al. does not teach nor suggest capture DNA nucleotide sequences fixed to the surface of the solid support at a density of at least 220 fmole of DNA

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molecules/cm<sup>2</sup> as claimed in Claim 2. As attested in the Declaration submitted herewith, at the time the invention was made, it was not possible to obtain a density of DNA molecules fixed to a solid support higher than 220 molecules/cm<sup>2</sup> for specific microarray use. Furthermore, Barner does not teach the production of an aldehyde group as an end product as recited in the claims. Instead, Barner uses strong oxidation conditions which result in the production of a carboxylic acid as an end product.

Applicant maintains that the process of Barner produces an aldehyde only as a transient intermediate in a reaction which produces a carboxylic acid as an end product. It is well known in the art that the oxidative effects of potassium permanganate can be increased by either raising its temperature or its concentration. The high concentrations of potassium permanganate (2.5 mM) together with high concentration of sodium periodate (100 mM) in Barner *et al.* would cause the presence of the aldehyde in the reaction mixture to be transitory. Thus, Barner *et al.*, in fact, teaches away from the invention as claimed in the Claim 2, where the formation of the aldehyde functions as the end product of the mild oxidation of olefinic groups.

Furthermore, in contrast to the claimed methods in which the capture molecules are bound to the aldehyde functions, in the methods of Barner the carboxylic acid is converted into an N-hydroxysuccinimide ester in the presence of pyridine and the biological molecules are attached to the ester. Thus, there is no suggestion in Barner of attaching capture DNA molecules to an aldehyde group as recited in the currently pending claims.

MacBeath *et al.* was published after the priority date of the present application (September 1, 2000), and therefore does not constitute prior art. Furthermore, MacBeath *et al.* describes using Telechem slides which are slides that have been treated with an aldehyde-containing silane reagent.

As attested in the Declaration submitted herewith, at the time the invention was made, it was not possible to obtain a density of DNA molecules fixed to a solid support of higher than 220 molecules/cm<sup>2</sup> as required for a microarray by using the Telechem slides. In conclusion, there is no teaching or suggestion in the cited references alone or in combination as to the method that would yield the density of the DNA molecules fixed to a solid support of higher than 220 molecules/cm<sup>2</sup> as recited in the currently pending claims. Therefore, Applicants assert that Claim 2, 5-7, 10 and 13 are non-obvious over Sundberg *et al.*, Barner *et al.* and MacBeath *et al.*, and respectfully request withdrawal of all rejections to the claims under 35 U.S.C. § 103(a).

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### CONCLUSION

In view of the foregoing, Applicants respectfully submit the present application is fully in condition for allowance. If any issues remain that may be addressed by a phone conversation, the Examiner is invited to contact the undersigned at the phone number listed below.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated:

April 20, 2005

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